

This aspect of the matter is treated of in the original preface, but we regret to see that it has been omitted from the English version. This is an injury to the book from the point of view of science, and an injustice to the reader, who would value the opinion of so careful an observer as M. Henry Vilmorin. It must suffice here to say that although he recognises the "unstable and perpetually changing characters" of plants, especially when submitted to cultivation, this variation, vast as it is, does not, in his opinion, affect either the number or the position of "legitimate species." M. Vilmorin's natural qualifications and his exceptional opportunities, of course, entitle him to be heard with very great respect, but we suspect most English botanists and cultivators would arrive at different conclusions from the same premises.

Of the value of this book to practical men it is not necessary to speak here: it is because it offers so valuable a storehouse of carefully observed facts of value to the biologist that we have alluded at such length to a volume which might at first be thought to be of interest to gardeners only, but which, we may repeat, is eminently worthy the attention of all those interested in the vast questions connected with variation and inheritance.

There are many points on which we should have liked to have commented, but the exigencies of space forbid. We have only to add that the translation has been well done by Mr. W. Miller, that some practical details have been added to adapt the book for English use, and that a very copious index is provided.

MAXWELL T. MASTERS

PROFESSOR MARSHALL ON THE FROG

The Frog; an Introduction to Anatomy and Histology.

By Prof. A. Milnes Marshall, M.D., D.Sc., M.A., F.R.S., Beyer Professor of Zoology in Owens College, Manchester. Second Edition. (Manchester: J. E. Cornish, 1885.)

THE teaching of biological science never received a greater impetus than that which took its origin in the establishment, fourteen years ago, of the laboratory at South Kensington, now associated with the Normal School of Science and Royal School of Mines; and the publication, some three years later, in connection therewith, of Huxley and Martin's "Elementary Biology," marks an epoch no less definite or important. The large number of teaching laboratories which have since been founded, wherever the English tongue is spoken and even on the Continent, have almost without exception been modelled directly or indirectly upon the Kensington plan. Practical directions for working have been issued in connection with most of them, compiled along the lines of Huxley and Martin, but specially adapted to the requirements of the individual schools. Of these, most are still alone used in the dissecting rooms for which they were written; some few have, however, been published separately, the volume before us being one of their number.

The author's name is a guarantee of the thoroughness of the work, and he has done well in taking such a prototype for a guide. We read in the preface that the book is a first instalment, to be followed by a second dealing with "types of the principal zoological groups;"

as the ultimate success of the project will depend upon the selection of these types, and especially upon the evenness of balance maintained in dealing with them, we reserve full criticism until the completed work is before us.

The present edition is mainly noteworthy for the introduction of illustrations—fifteen in number. The original ones are for the most part somewhat rough, though accurate in detail, and they have the merit of representing the structures as they will meet the eye of the student. Fig. 10, however, would bear recutting, for if the bones are "represented black" why not the columella-auris; and continuity should certainly be shown between the brain and very sketchy labyrinth. The maxillo-palatine commissure—described (p. 84) in its proper place—should also find a representative in Fig. 13, and in connection with the renal-portal vein of Fig. 4 afferent renal branches might be advantageously introduced. The relation of the mesentery to the kidneys in Fig. 2 also needs looking into.

The text bears the mark of a writer in full sympathy with the difficulties which beset a beginner; more importance might, however, well be given to a consideration of those matters of symmetry, locality, and general utility, which must be mastered before studying anatomy proper. The customary restrictions put upon at least the terms *anterior*, *posterior*, *lateral*, should be clearly set down in addition to those given on p. 13 and elsewhere, and the positions of the organs should be described accordingly. If this were so, the description of the liver given on p. 17 would, for example, be more accurately rendered than it is.

It would facilitate the demonstration of the bile ducts in so small an animal, if the student were directed to simply squeeze the gall-bladder after having opened up the intestine, instead of risking the insertion of a destructive bristle as advised on p. 20.

A special feature has been made of the histological section of the work, but, granting its thoroughness, we would fain see some of the frog's tissues retained for those supplemented from other animals, especially in the case of bone, where so highly instructive an example as that of the long bone is to hand. In describing the nerve fibre the nodes of Schmidt have been overlooked, but here our author is not alone; considering the years that have elapsed since their discovery, it is strange that they should only recently have found mention in our English text-books. Reflecting on the doubtful nature of the so-called non-medullated nerve-fibres, it is a pity that the ultimate ramifications of a medullated fibre in so out-of-the-way a place as the cornea should be made (p. 89) to do duty for them.

The book is neatly and carefully got up, but a future edition should not be published without an index. The description of the mesentery in relation (p. 18) to the alimentary canal, and those of the attachments of the corpus adiposum and testes (p. 17) might well be much modified; and the like is true of the statement that the skeleton gives (p. 45) "precision to the movements" of the body. The heading (p. 48), "peculiar vertebræ," is bad, and olfactory *sacs* reads on p. 49 "olfactory nerves," in error. A somewhat remarkable typographical error is the "mpanic cavity" of p. 98.

In conclusion, we would take exception to the references (pp. 28 and 74) to the suppressed aortic arches of the embryo and to the mode of development of the nervous axis, unless their introduction bears upon the lecture scheme adopted at the Victoria University. If so, well and good, but if not, we are of opinion that such supplemental statements should be inserted, in a book of this kind, as footnotes or their equivalents. It is sufficient that the beginner should realise that three pairs of aortic arches exist in the adult, alone under consideration.

OUR BOOK SHELF

Methods of Research in Microscopical Anatomy and Embryology. By C. O. Whitman, M.A., Ph.D. (Boston: S. E. Cassino and Co.; London: Trübner and Co. 1885.)

WITHIN the last few years a number of new methods have been suggested for use in microscopical, and more particularly embryological, research, and a glance at almost any one of the recent memoirs on these subjects will serve to show how much is due to the employment of new methods. It is, however, extremely important not to lose sight of the fact that complicated methods are exceedingly likely to produce false or misleading appearances. To carry on successfully any microscopical research it will probably be necessary to invent new methods or at any rate modify old ones to suit the exigencies of the case. To do this an acquaintance with the methods which have been used by previous observers is necessary, and in addition a clear idea of such general principles as it is possible to formulate with regard to the action of various classes of reagents upon various tissues.

A great number of the new methods have been described, and this often in a few words only, in special memoirs, so that they are often overlooked.

"Hitherto," says the author of the work before us, "most of our standard books of reference on methods have been rather complex in character, dealing with the microscope and technical methods as subordinate and introductory to the main subject of histology."

With regard to certain special methods there appears unfortunately to be a reluctance on the part of their inventors to reveal what they thus make a sort of trade secret, "withholding it on the ground that others are not entitled to the advantages of your experience." Dr. Whitman in his present work has sifted the numerous methods which have been suggested, and has given histologists the benefit of his great practical experience in rejecting some while recommending others; he has also endeavoured to formulate as many general principles as possible, though of course there is more to be done in this respect, our knowledge being at present insufficient to generalise to any great extent.

We notice with regret a slight tendency in the work before us as well as certain histological schools to neglect almost entirely the older and simpler methods of cutting sections. Serial section-cutting is now such an important item in all morphological work that it is apt to be used to the exclusion of older methods, which give in many cases undoubtedly better histological results.

Dr. Whitman has also collected a large number of most important observations with regard to the best method, time, and place of obtaining material; these are of course very incomplete, but it is to be hoped that he will see his way towards continuing them, and that others will follow his excellent example.

Alternating Currents of Electricity. By Thomas H. Blakesley, M.A. "Electrician Series." (London: Published at the Office of the *Electrician*, 1885.)

THIS is a very unsatisfactory little book; indeed it is difficult to find anything favourable to say of it, except that

it is concerned with a subject which is of considerable importance, and which might be treated in an interesting and instructive manner. It is a reprint of papers, originally published in the *Electrician*, on Alternating Currents of Electricity, and professes to deal with various problems connected with them by geometrical methods. But the methods are long and intricate, and the work is not well done;—carelessly written and printed in the beginning, the style remains unchanged. The errors in form are numerous, the figures are not good, and geometry and algebra are mixed up in formulas in the most puzzling and irritating way. We find commas between the factors of products (all through pp. 11, 12, 13), and diagrams in which the letters are illegible in several places. In one investigation covering three or four pages, we have the letter *C* used for capacity of a condenser, for electric current, for the sum of a series of cosines, and for designating points in the diagrams. In fact the whole book is full of confusion, and is a model of what mathematical writing ought not to be; while we cannot imagine that it will prove useful or even intelligible to the telegraph engineers for whose benefit we may suppose it was put together.

J. T. B.

Third Annual Report of the New York Agricultural Experiment Station, for the Year 1884. (Albany, N.Y.: Weed, Parsons, and Co.)

THIS Experiment Station was established by an Act of Legislature passed in 1880, and amended in 1881. The management is intrusted to a Board of Trustees, who appoint a director, horticulturist, botanist, chemist, stenographer, farmer, and assistants. Such an organisation must be considered as a step in advance beyond anything yet done in this country, being a direct action on the part of the Government to promote the exact knowledge of agriculture. This is the main point we desire to bring before the readers of NATURE. Among the many voices raised on behalf of technical instruction of artisans and others engaged in industrial pursuits, or of musicians and artists, few are to be heard in favour of the promotion of exact agricultural knowledge. The Americans are wiser, and are establishing what they call "experiment stations" in various parts of their wide territory. A few of the objects of investigation at present occupying the attention of the staff of the New York Station may be enumerated as follows:—(1) Fertiliser analysis; (2) sample orchards containing single trees of each known variety; (3) soil temperatures at various depths; (4) digestibility of various foods; (5) germination of commercial seed; (6) a study of maize; (7) root-distribution by root-washings; (8) milk; (9) diseases of plants. These sections furnish material for 418 pages, abounding in tables of results of great practical value. The pains taken in thoroughly working out the conditions of milk-production in the case of two cows, "Meg" and "Gem," are evidence of great activity and zeal. The weight of the cows was taken daily from September 17 to November 12. The weight of food consumed, the accurate analysis of the food, the daily weight of solid and liquid excrements, the daily yield of milk, the daily analysis of the milk,—all this carefully and punctually recorded, and fixed in tables, is a work of great importance, not only as bearing directly upon dairying, but having likewise a physiological value. Such constant daily observations are not only essential, if the experiment is to be of any practical value, but must be beyond the efforts of practical farmers, who really ought not to undertake such investigations. But the value to the community at large when such experiments are conducted quietly and regularly by persons specially set apart and paid to carry them out cannot be overrated. They must not be attempted by ordinary dairymen in ordinary stalls, and with ordinary business appliances, but can only be carried out by trained hands, in specially constructed stalls and with special arrangements, all of which must